

REMARKS:

Applicant has carefully studied the nonfinal Examiner's Action and all references cited therein. The amendment appearing above and these explanatory remarks are believed to be fully responsive to the Action. Accordingly, this important patent application is now believed to be in condition for allowance.

Applicant responds to the outstanding Action by centered headings that correspond to the centered headings employed by the Office, to ensure full response on the merits to each finding of the Office.

Claim Rejections – 35 U.S.C. § 101

Applicant acknowledges the quotation of 35 U.S.C § 101.

Claims 1-6 stand rejected under 35 U.S.C § 101, for failing to define any structural and functional interrelationships that permit functionality to be realized. More specifically, claims 1-6 stand rejected for reciting "a signal space" which is considered as non-functional descriptive material, i.e., mere data.

Claims 1-6 have been amended to establish the functional interrelationship as disclosed by the present invention. As described in paragraphs [0004] and [0005] of the specification, a quadrature amplitude modulation scheme is a component of a modulation system utilized in data communications. As such, the quadrature amplitude modulation signal, represented by a constellation in the complex plane, is provided by the modulator of a data communication system.

Claim Rejections – 35 U.S.C. § 102

Applicant acknowledges the quotation of 35 U.S.C § 102(b).

Claims 1-9 stand rejected under 35 U.S.C § 102(b) as being anticipated by Laurent (French Patent No. 2,606,233).

With reference to MPEP 706.02, in order to establish an anticipation rejection under 35 U.S.C. 102, the reference cited must teach every aspect of the invention either explicitly or impliedly and any feature not taught must be inherently present. The Office has rejected claims 1-9, however the Office has only provided a rejection of the elements of claim 1. It has been established by *Gechter v. Davidson*, 116, F. 3d 1454, 43 USPQ 2d 1030 (Fed Cir. 1997) that the responsibility lies with the Patent and Trademark Office that a claim must first be correctly construed to define the scope and meaning of each contested limitation and that an analysis be conducted on a limitation by limitation basis, with specific fact findings for each contested limitation and satisfactory explanations for such findings. Additionally, the Patent Office provides a general definition of prima facie unpatentability as follows:

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

The Office has not conducted an analysis of the claims on a limitation by limitation basis and as such the Applicant contends that the rejection is procedurally defective under the Manual of Patent Examining Procedures and respectfully requests that specific evidence be provided to the Applicant for the rejections of claims 2-9.

With specific regard to the rejection of claim 1, the Office states that Laurent discloses a method for multi-dimensional modulation of a binary signal comprising a symmetrical spherical quadrature amplitude modulation constellation in a multi-dimensional complex plane, the constellation bounded by a surface comprising all symbol points at a predetermined distance from a center point coincident with an intersection of at least two axes, and corresponding in relative position to the symbol points on opposite sides of the axes at Fig. 1, and page 8, lines 1-5.

The Applicant respectfully traverses the finding of the Office.

The Office contends that Laurent teaches a symmetrical spherical quadrature amplitude modulation constellation in a multi-dimensional complex plane at page 8, lines 1-5. Under 35

U.S.C. section 112, a prior art reference must be enabling and for a prior art reference to establish anticipation, the description must enable a person with ordinary skill in the art not only to comprehend the invention, but also to make it, *Paperless Accounting, Inc. v. Bay Area Transit Sys.*, 804 F.2d at 665, 231 USPQ at 653. The Laurent reference does not enable one of ordinary skill in the art to make a symmetrical spherical quadrature amplitude modulation constellation as disclosed and claimed by the present invention. In fact, Laurent does not describe a procedure by which a specific modulation constellation is created but instead the Laurent patent provides a procedure for modulation wherein a binary signal of a one-dimensional vector space is transcribed in order to obtain a signal that can be represented in a vector space with N dimensions, pg. 1, Abstract. Additionally, Laurent states at pg. 20, that the procedure and the devices of modulation and demodulation that have just been described in a space structure with four dimensions allow one to obtain performance levels superior to those that can be obtained with a space structure with only one dimension. As such, the procedure and devices described by Laurent do not establish a symmetrical spherical constellation, but instead teach a procedure and device to adapt known binary strings into an alphabet from a four dimensional space. With specific reference to the tables presented in Fig. 1 and Fig. 2, the table of Fig. 1 presents coordinates to establish a square constellation and the table of Fig. 2 shows the mapping of the constellation points in four dimensions as linear combinations of the basis function (4D Walsh sequences as in Equation (9) of Laurent). In effect, that does not alter the shape of the constellation but merely rotates the axes by $\pi/4$ radians. The establishment of an N dimensional vector space of a known modulation constellation is not equivalent to the establishment of a symmetrical spherical constellation as disclosed by the present invention.

As cited by the Office, Laurent describes a vector space of M possible signals that is determined so that the set of M points is represented inside a sphere of the smallest possible radius. Placement of symbol points *inside* (emphasis added) a sphere of the smallest possible radius is an objective of all QAM constellations. As described by Laurent at page 4, lines 4-13, the use of a large number of dimensions leads one on the theoretical level to consider a spherical model for representation of signals in which the signals M are points inside a sphere of radius R. The minimal distance that separates two distinct points increases with the number of dimensions in question. As one desires to have available M distant points from at least one minimal distance, in a sphere with N dimensions, the radius R of the sphere decreases when the number N

of dimensions increases. As such, on a theoretical level, a spherical model is desired because it provides a low bit error rate and low power consumption. However, the disclosure by Laurent does not *enable* (emphasis added) a symmetric spherical constellation with the smallest possible radius as disclosed and claimed by the present invention.

The Office relies on pg. 8, lines 1-5, and Fig. 1 of Laurent to establish anticipation of claim 1. The Office has not presented any additional evidence that the Laurent reference adequately describes the subject matter of the present invention to place it in the public domain. As such, the Office has not cited a reference that teaches or enables each of the claimed elements expressly or inherently as interpreted by one of ordinary skill in the art, and as such a *prima facie* case of anticipation has not been established.

For the reasons cited above, Applicant believes that amended independent claim 1 is not anticipated by Laurent and is believed to be in condition for allowance.

Claims 2-8 are dependent upon claim 1, and are therefore allowable as a matter of law.

As previously stated, rejections relating to the limitations of claim 9 have not been presented by the Office, as such, claim 9 is believed to be in condition for allowance.

If the Office is not fully persuaded as to the merits of Applicant's position, or if an Examiner's Amendment would place the pending claims in condition for allowance, a telephone call to the undersigned at (727) 507-8558 is requested.

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Very respectfully,
SMITH & HOPEN

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